

REDISCOVERY OF *ELEOCHARIS KLEINII* (CYPERACEAE),  
AN OVERLOOKED SPECIES FROM THE HIGHLANDS OF SOUTH BRAZIL

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ABSTRACT

Dr. Manuel Barros described *Eleocharis kleinii* in 1966 based on only one collection from Santa Catarina state, Brazil. The species is closely related to *E. liesneri* differing in features of the culms, floral scales, perianth bristles, and achene surface sculpturing. An expanded description, notes on ecology and conservation status, additional and recent specimen citations from Santa Catarina and Rio Grande do Sul states, a key to distinguish *E. kleinii* from the similar species, and illustration are presented.

RESUMO

Dr. Manoel Barros descreveu *Eleocharis kleinii* em 1966 tendo como base um único material coletado no estado de Santa Catarina, Brasil. *E. kleinii* é semelhante à *E. liesneri* diferindo desta pelas características do escapo, glumas, cerdas perigonais e ornamentação da superfície do aquênio. Este trabalho consiste de uma descrição ampliada da espécie, notas ecológicas e status de conservação, citação de materiais recentemente coletados nos estados de Santa Catarina e Rio Grande do Sul, uma chave dicotômica para distinguir *E. kleinii* de espécies semelhantes e ilustrações.

*Eleocharis* R. Br. is a worldwide genus that includes ca. 200 species with a remarkable richness in tropical and subtropical America (González-Elizondo & Tena-Flores 2000). Distinctive features, such as unbranched aerial culms, leaves reduced to tubular sheaths, an inflorescence constituted of one spikelet on the apex of culms without involucral bracts, and the stylopodium enlarged and persistent on the achene are uniformly found in this genus. Almost all species of *Eleocharis* are restricted to wetlands, often in muddy soils that are temporarily wet or inundated. The genus has not been treated comprehensively since the seminal work of Svenson (1929, 1932, 1934, 1937, 1939). Others (Blake 1939; Barros 1947, 1960; González-Elizondo 1994; Faria 1998; González-Elizondo & Reznicek 1998; Smith et al. 2002; Gil 2007; Trevisan 2005) have provided more regional treatments.

Trevisan and Boldrini (2005) published records of *Eleocharis ochrostachys* Steud. from Rio Grande do Sul and Santa Catarina States, Brazil. However, additional study of the specimens cited, including comparison to types of *E. ochrostachys*, led us to consider that these collections possibly represented an undescribed species of *Eleocharis*. Recent correspondence with Drs. Rosa Guaglianone (SI) and Socorro González-Elizondo (CIIDIR) has brought to our attention that one of the specimens studied by the first author (*Klein 3718a*) while visiting Herbário Barbosa Rodrigues (HBR) in September, 2006, is the holotype of a poorly known species from the highlands of South Brazil, *Eleocharis kleinii* Barros. The holotype bears no annotation as either *E. kleinii*, or as a type, hence our earlier opinion that it was an undescribed species. We found no reference to this species in checklists or floristic treatments since the protologue, although it is to be included in the forthcoming *Catálogo de la Flora del Cono Sur* (pers. comm. Drs. Rosa Guaglianone and Socorro González-Elizondo).



The protologue of *Eleocharis kleinii* provides only a brief description based on a single specimen from Santa Catarina state with no illustration. The purpose of this manuscript is to improve the knowledge of *E. kleinii* by providing an expanded description, ecological information and conservation status, additional specimen citations, a key to distinguish *E. kleinii* from the similar species, and illustration.

**Eleocharis kleinii** Barros, Sellowia 18:49. 1966. (Fig. 1 a–e). TYPE: BRAZIL: Santa Catarina, Irineópolis (=Valões), 10 Dec 1962, R.M. Klein 3718a (HOLOTYPE: HBR!; ISOTYPE: SI!).

**Perennial** herb; roots coarse, fibrous, mostly drab-brown; rhizomes elongated, 2–3 mm thick, dark maroon, the scales 1.2–1.5 cm long. **Culms** obtusely trigonous distally, terete proximally, 30–70 cm × 1.3–2 mm, soft, internally spongy with incomplete transverse septa, smooth to finely longitudinally striate, light green (grayish green when dry). **Leaves** 2, reduced to sheaths, membranous, loose, friable, proximally venose, upper sheath 7–18 cm, apex narrowly acuminate and extended into a soft awn, proximally dark maroon, becoming chestnut to tawny distally. **Spikelets** cylindrical, acute, 12–32 × 2.5–4 mm, two times wider than culms, 16- to 30-flowered; proximal scale empty (rarely with a flower), amplexicaulous and appearing as a continuation of the culm; remaining fertile floral scales conspicuously arranged in 4 spiraled rows, weakly imbricate, somewhat appressed to loose at maturity, ovate, 5–6.2 × 2–3.5 mm, medially cartilaginous, marginally and distally translucent hyaline-erose, central area slightly round-keeled, apex acute, abaxial veins slightly raised to cellular-lineate (the centrally located veins sometimes reddish), only mid-vein distinguishable in adaxial view, medially greenish to stramineous, laterally reddish. **Flowers** with 6 perianth bristles, slender distally, becoming slightly coarser proximally, sub-equal, exceeding the stylopodium, densely retrorsely spinulose to below the middle with fine spinules, white to yellowish white; stamens 3; anthers 1.9–2.1 mm long, yellow to stramineous; style bifid or trifid. **Achenes** biconvex, obovoid to obpyriform, 2–2.2 mm × 1.3–1.4 (1.9) mm, with 20–28 longitudinal rows of slightly transversely elongated polygonal cells, finely sculptured to nearly smooth at 20×, dull buff yellow maturing to olivaceous, apex constricted to a distinct neck. **Stylopodium** triangularly elongate, dorsoventrally compressed with a thickened basal rim, somewhat curvate, 0.7–1.5 × 0.5–0.6 mm, dark brown.

**Distribution.**—South America: Brazil (Rio Grande do Sul and Santa Catarina states). Endemic to the highlands of South Brazil, this species has been endangered by the silviculture of *Pinus* species. Some wetlands have been dried to cultivate this exotic species on a large scale. The species fits in category of Vulnerable in level D (UICN 2001).

**Habitat.**—The species grows in permanently flooded environments in highlands of South Brazil. The plants generally have culms partially submerged, forming clonal masses (Fig. 2). *Eleocharis kleinii* occurs above 30° latitude S, between 500–1400 m above sea. These high regions are the coldest in South Brazil, with an average temperature of ca. 17°C and winter occurrences of frost or snow (Boldrini 1997). The pluviometry is 1500 to 2000 mm a year with rains distributed throughout the year (Moreno 1961).

Other Specimens Examined. **BRAZIL. Rio Grande do Sul:** Cambará do Sul, Faxinal, Dec 1983, M. Sobral & J. R. Stehmann 2717 (FLOR, ICN), Cambará do Sul, Feb 1948, B. Rambo 36659 (PACA); Campestre da Serra, BR 116, km 70, 03 Nov 2003, Trevisan, R. Lüdtké, M. Vignoli-Silva & L. Mentz 133 (ICN); São Francisco de Paula, 1996, H.M. Longhi-Wagner (ICN 129292); São Francisco de Paula, 29°17'57" S 50°20'08.8" W, 28 Nov 2003, Trevisan & Boldrini 309 (ICN, MO, TAES); São José dos Ausentes, Serra da Rocinha, 03 Feb 1953, B. Rambo 53898 (HBR, PACA). **Santa Catarina:** Bom Jardim da Serra, desfiladeiro do Funi, Feb 1989, M. Sobral et al. 6480 (ICN); Bom Jardim da Serra, Serra do Oratório, 15 Dec 1958, R. Reitz & R. Klein 7991 (HBR); Matos Costa, SC 302, km 31, 26°27'41" S 51°07'32,1" W, 21 Dec 2006, R. Trevisan 804 (ICN).

Barros (1966) correctly placed *Eleocharis kleinii* in subgen. *Limnochloa* (P. Beauv. ex Lestib.) Torr. This species is included in this subgenus on the basis of the following features: indurate floral scales with a distinct hyaline margin; proximal scale appearing as a continuation of the culm; achenes ornamented with longitudinal rows of polygonal cells (González-Elizondo & Peterson 1997). Barros (1966) indicated that *E. kleinii* was very close to *E. elongata* Chapm., sharing with it slender culms and aquatic habitat. However, we believe that *E. kleinii* is most closely related to *E. liesneri* S. González & Reznicek (Fig. 1 f–g), another species from the highlands of South America (González-Elizondo & Reznicek 1998; Rosen 2006). *Eleocharis kleinii* differs from *E. liesneri*



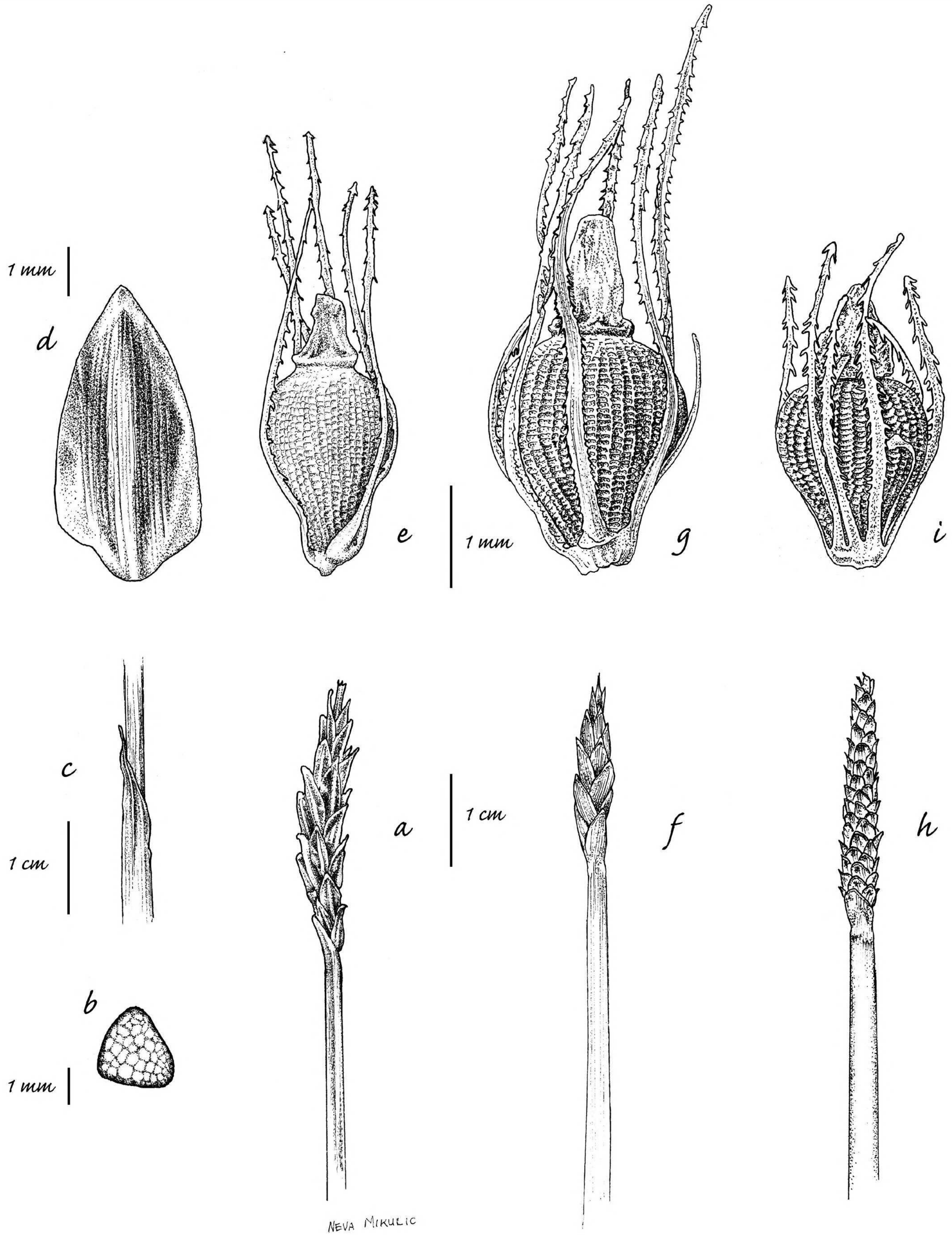


FIG. 1. *Eleocharis kleinii* Barros. a. Detail of spikelet and distal end of culm. b. Cross section at distal end of culm. c. Detail of upper leaf sheath apex. d. Fertile floral scale. e. Detail of achene. *Eleocharis liesneri* S. González & Reznicek. f. Detail of spikelet and distal end of culm. g. Detail of achene. *Eleocharis obtuse-trigona* (Lindl. & Nees) Steud. h. Detail of spikelet and distal end of culm. i. Detail of achene. Drawn by Neva Mikulicz.





FIG. 2. Habitat of *Eleocharis kleinii* Barros. Photograph taken in Santa Catarina state, Matos Costa, SC 302, km 31, 26°27'41" S 51°07'32,1" W in 21 Dec 2006. Land clearing in the background of the picture is in preparation for potato cultivation.

in its obtusely trigonous culms, narrowly acuminate leaf sheaths extended into a soft awn, floral scales medially greenish to stramineous and laterally dark reddish, finely sculptured to nearly smooth achenes, and less coarse perianth bristles. *Eleocharis kleinii* also appears to be closely related to *E. obtusetrigona* (Lindl. & Nees) Steud. (Fig. 1 h–i), differing in its shorter and narrower culms, narrowly acuminate leaf sheath apex, fewer flowered spikelets, longer, less imbricate and conspicuously laterally reddish floral scales, relatively longer and less coarse perianth bristles, and achenes that are finely sculptured to nearly smooth with more numerous longitudinal rows of epidermal cells. The occurrence in *E. kleinii* of floral scales with medially greenish to stramineous and laterally reddish coloration is unique among currently known New World species of subg. *Limnochloa*. The following key will help distinguish between these three taxa.

KEY TO SEPARATE *E. KLEINII*, *E. LIESNERI*, AND *E. OBTUSETRIGONA*

1. Exposed portion of floral scales longer than wide; spikelet 12–30-flowered; perianth bristles over 2-times achene length; mature achenes olivaceous to light brown with 20–28 longitudinal rows of slightly transversely elongated polygonal cells.
  2. Culms 1.3–2 mm wide, obtusely trigonous distally; upper sheath apex narrowly acuminate and extended into a soft awn; perianth bristles relatively fine; achene surface finely sculptured to nearly smooth; floral scales medially greenish to stramineous, laterally dark reddish \_\_\_\_\_ ***E. kleinii***
  2. Culms 2–4 mm wide, terete (obscurely 3-angled); upper sheath apex acute, not extended into a soft awn; perianth bristles relatively coarse; achene surface coarsely sculptured; floral scales medially greenish to stramineous with a subapical dark brownish splotch, laterally stramineous \_\_\_\_\_ ***E. liesneri***
1. Exposed portion of floral scales about as long as wide; spikelet 40–100-flowered; perianth bristles less



than 2-times achene length; mature achenes dark green spotted with amber or rarely entirely amber with 11–18 longitudinal rows of transversely reniform (at least the most centrally located) polygonal cells

***E. obtusetrigona***

Faria (1998) cited *Eleocharis laxiflora* (Thwaites) H. Pfeiff. (a currently accepted synonym of *E. ochrostachys*) from São Paulo state, however, the description and illustrations are close to *E. kleinii* and perhaps those materials studied belong instead to this species. The superficial resemblance of *E. kleinii* to the Old World *E. ochrostachys* is due to the occurrence in both species of spikelets wider than the slender culms and weakly imbricate floral scales. *Eleocharis kleinii* differs markedly from *E. ochrostachys* in the nature of the constriction between the stylopodium and achene. In *E. kleinii*, the stylopodium is well differentiated from the achene apex, which is markedly constricted to a short neck. In *E. ochrostachys*, the stylopodium arises from the central sunken region of an annular thickening at the achene apex. *Eleocharis ochrostachys* also differs from *E. kleinii* in having usually distally terete to weakly-angled culms, acute leaf sheaths, and red-maculate floral scales with wider marginally and apically translucent hyaline-rose regions.

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